

### REMARKS

Claims 1-5 and 7-10 are pending in this application. Claims 1 and 7 have been amended. Claim 6 has been canceled and its limitations have been incorporated in amended independent claim 1. No new matter has been introduced.

Before addressing the rejections of claims 1-5 and 7-10, Applicants submit that the present invention is directed to a chemical process involving "partial oxidation of hydrocarbons" for producing CO (and H<sub>2</sub>). Applicants attach as Exhibit A relevant pages from Ullmann's Encyclopedia of Industrial Chemistry, 6th Ed., outlining principles of partial oxidation of hydrocarbons. In contrast, Santiago et al. (U.S. Patent No. 3,876,384), Ravault (U.S. Patent No. 3,895,917), Deshpande (U.S. Pat. Appl. Pub. No. 2002/0090326) and Arment et al. (U.S. Patent No. 5,570,576) (each described in more detail below) all relate to "oxidation of CO to CO<sub>2</sub>" and not to "partial oxidation of a hydrocarbons," as in the claimed invention. The catalyst components and reaction temperatures of partial oxidation of hydrocarbons (the claimed invention) are different from those for oxidation of CO to CO<sub>2</sub> (the process for exhaust gas cleaning of Santiago, for example). Accordingly, one skilled in the art would not have been motivated to modify the teachings of Santiago, Ravault, Deshpande and Arment, or to combine these teachings, to arrive at the subject matter of claims 1-5 and 7-10.

Claims 1, 2 and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Santiago et al. (U.S. Patent No. 3,876,384). Reconsideration is respectfully requested.

The claimed invention relates to a "reactor for chemical processes involving catalytic reactions of gasses at high temperatures." As such, amended independent claim 1 recites a "reactor for chemical processes involving catalytic reactions of gasses at high temperatures" comprising "a reactor shell comprising an inlet and an outlet, the reactor shell being suitable for operation at elevated pressures" and "a metallic basket

. . . comprising an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel, the metallic basket having sidewalls insulated by a layer of insulation material which is provided between the sidewalls of the metallic basket and an inner wall of the reactor shell." Amended independent claim 1 also recites that "the basket further comprises a fixed catalyst bed comprising particles or a monolith active in catalytic partial oxidation of hydrocarbons, said fixed catalyst bed being supported by said bottom and surrounded by said metallic sidewalls." Amended independent claim 1 further recites that "the inlet channel coincides with the inlet of the reactor shell."

Santiago relates to a "monolithic catalyst carrier body . . . resiliently mounted in a reactor casing by surrounding the body with a protective jacket which has highly heat resistant steel reinforcing means embedded in ceramic fiber and binder means." (Abstract). According to Santiago, "[P]referably a heat resistant steel wire mesh or mat is embedded between two mats of heat resistant mortar and mineral fibers." (Abstract).

Santiago does not anticipate the subject matter of claims 1, 2 and 10. Santiago fails to disclose "a metallic basket . . . comprising an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel," as amended independent claim 1 recites. Santiago teaches catalyst carrier body 2 provided with "fine channels 3" through which exhaust gasses pass, and not a "a metallic basket . . . comprising an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel," as in the claimed invention. Further, the catalyst carrier body 2 of Santiago is configured to be used "for the detoxification of exhaust gases of internal combustion engines wherein the body has a large surface and a plurality of gas flow channels" (col. 2, ll. 6-9), and is not "a fixed catalyst bed comprising particles or a monolith active in catalytic partial oxidation of hydrocarbons, said fixed catalyst bed being supported by said

bottom and surrounded by said metallic sidewalls" of the basket, as in the claimed invention.

Applicants also submit that the Examiner's comparison of the solid basket (3) of present invention with the wire mesh (8) of Santiago (col. 3, ll. 20-24) is misplaced. The basket of present invention prevents gas from entering the insulating material (p. 4, ll. 1-3). Inside the wire mesh (8) of Santiago, a layer is installed comprising ceramic fibers (6) embedded in mortar (col. 2, ll. 47-50) and a similar layer (7) outside the wire mesh (col. 2, ll. 47-53). Elements 6, 7 and 8 form a protective jacket (col. 3, ll. 45-52) for the catalyst to avoid damage due to chocks (col. 1, ll. 20-27), which are inevitable in vehicles, where the exhaust gas cleaning reactor of Santiago is installed. Thus, the basket of present invention cannot be compared with the steel reinforcement of Santiago. The present invention provides a reactor for partial oxidation, where the catalyst rests on a grid which is completely different from the catalyst of Santiago. The layer of ceramic fibers in a mortar (col. 2, ll. 45-52) or putty (col. 3, ll. 18-20) of Santiago is different from the coating layer entirely of a ceramic material on a solid basket wall (page 4, ll. 1-3, ll. 22-24) of the present invention.

For at least these reasons, Santiago fails to anticipate the subject matter of claims 1, 2 and 10, and withdrawal of the rejection of these claims is respectfully requested.

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Santiago in view of Mentschel (U.S. Patent No. 4,018,573). Reconsideration is respectfully requested.

The subject matter of claim 3 would not have been obvious over the cited prior art references, whether considered alone or in combination. The November 15,

2006 Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

In the present case, Santiago and Mentschel, considered alone or in combination, fail to disclose, teach or suggest all limitations of amended independent claim 1. As noted above, Santiago is silent about “a metallic basket . . . comprising an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel,” or about “a fixed catalyst bed comprising particles or a monolith active in catalytic partial oxidation of hydrocarbons, said fixed catalyst bed being supported by said bottom and surrounded by said metallic sidewalls” of the basket, as in the claimed invention. Santiago teaches catalyst carrier body 2 provided “for the detoxification of exhaust gases of internal combustion engines wherein the body has a large surface and a plurality of gas flow channels” (col. 2, ll. 6-9), and not the limitations of the claimed invention.

Mentschel fails to supplement the deficiencies of Santiago. Mentschel teaches a heat exchange reactor and not a “reactor for chemical processes involving catalytic reactions of gasses at high temperatures” comprising “a metallic basket” having “an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel,” as in the claimed invention. Mentschel

discloses an electric heater (fig 2, col. 7, ll. 25-26) provided in post 105, which is a reactor of a distinctive and different layout from that of the claimed invention.

Mentschel also does not disclose, teach or suggest that "the basket comprises a fixed catalyst bed" or that "the inlet channel coincides with the inlet of the reactor shell," as claim 1 recites. In fact, Mentschel teaches against the use of an insulation material between the reactor walls and the reactor shell. Mentschel specifically teaches that "[t]he space between the inner wall 2 and intermediate wall 10 is in communication with the reaction chamber 1 through apertures 14 in the cover 3" (col. 5, ll. 8-11) and, thus, Mentschel does not disclose, teach or suggest a "metallic basket having sidewalls insulated by a layer of insulation material which is provided between the sidewalls of the metallic basket and an inner wall of the reactor shell," as in the claimed invention. For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claim 3 is respectfully requested.

Claims 4, 5 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Santiago in view of Mentschel and further in view of Ravault (U.S. Patent No. 3,895,917) and Deshpande (U.S. Pat. Appl. Pub. No. 2002/0090326). Reconsideration is respectfully requested.

The subject matter of claims 4, 5 and 7 would not have been obvious over the cited prior art references, whether considered alone or in combination. None of the cited references discloses, teaches or suggests all limitations of amended independent claims 1 and 7. As noted, Santiago and Mentschel fail to disclose all limitations of claim 1. Ravault does not disclose, teach or suggest the subject matter of claim 1. Ravault teaches an "exhaust gas reactor" which is close to the engine and which contains an arrangement of baffles to allow the fluid stream to travel a long path. (Col. 1, ll. 19, 41-43). Ravault does not disclose, however, "a reactor shell" and "a metallic basket" with

“an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel,” as amended independent claim 1 recites. Ravault is also silent about a “basket” that “comprises a fixed catalyst bed” and having an inlet channel that “coincides with the inlet of the reactor shell,” as in the claimed invention.

Deshpande also does not disclose, teach or suggest the subject matter of amended independent claim 1. Deshpande teaches a spiral heat exchanger with no insulation material and, thus, Deshpande also fails to disclose, teach or suggest a “reactor for chemical processes involving catalytic reactions of gasses at high temperatures” comprising “a metallic basket” having “an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel,” as claim 1 recites.

The cited references, alone or in combination, also fail to disclose, teach or suggest the subject matter of amended independent claim 7. None of Santiago, Mentschel, Ravault and Deshpande discloses, teaches or suggest “providing . . . a metallic basket suitable for operation at elevated temperatures inside the reactor shell, the metallic basket comprising an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel . . . wherein the basket further comprises a fixed catalyst bed for catalytic partial oxidation of hydrocarbons, the fixed catalyst bed being supported by said bottom and surrounded by said metallic sidewalls,” as claim 7 recites.

Applicants further submit that a person of ordinary skill in the art would not have been motivated to combine the teachings of Santiago with those of Mentschel Ravault and Deshpande. Santiago and Ravault disclose processes for exhaust gas cleaning. Deshpande discloses a process for producing fuel for a fuel cell comprising

hydrogen. In contrast, Mentschel discloses a process for conversion of hydrocarbons to a fuel comprising methane, carbon monoxide and hydrogen, the process comprising partial oxidation. In addition, the reactor of Mentschel has a design different from the reactors of Santiago, Ravault and Deshpande, and it is used in a vehicle (col. 4, l. 5-15, and col. 7, ll. 47-50). Further, the only information about the catalyst of Mentschel is that it comprises alumina (col. 6, ll. 47-52). Even if the catalyst of Ravault were to be loaded in the reactor of Santiago, this would only teach how to clean an exhaust gas by oxidising CO to CO<sub>2</sub>, and not partial oxidation of a hydrocarbon to form hydrogen and CO, as in the claimed invention or as in Mentschel.

Deshpande discloses a reactor module for producing compact fuel for fuel cells. Paragraph [0032] of Deshpande describes the process step where CO is oxidized to CO<sub>2</sub>. However, CO<sub>2</sub> is an undesired product for the process of claimed invention. Thus, Deshpande does not disclose, teach or suggest a catalyst for the partial oxidation of present invention, and one skilled in the art would not have been motivated to modify or combine the oxidation of CO to CO<sub>2</sub> of Deshpande, to arrive at the claimed invention. For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 4, 5 and 7 is also respectfully requested.

Claims 8 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Santiago in view of Mentschel, Ravault and Deshpande, and further in view of Arment et al. (U.S. Patent No. 5,570,576). Reconsideration is respectfully requested.

The subject matter of claims 8 and 9 would not have been obvious over the cited prior art references, whether considered alone or in combination. None of Santiago, Mentschel, Ravault, Deshpande and Arment discloses, teaches or suggests the subject matter of claim 7. As noted, Santiago, Mentschel, Ravault and Deshpande,


alone or in combination, do not disclose, teach or suggest the step of "providing . . . a metallic basket suitable for operation at elevated temperatures inside the reactor shell, the metallic basket comprising an inlet channel, metallic sidewalls, and a bottom opposite the inlet channel and located in a direction transverse to the inlet channel . . . wherein the basket further comprises a fixed catalyst bed for catalytic partial oxidation of hydrocarbons, the fixed catalyst bed being supported by said bottom and surrounded by said metallic sidewalls," as claim 7 recites. Arment fails to supplement the deficiencies of Santiago, Mentschel, Ravault and Deshpande. Arment teaches a catalytic heater with staged exhaust exotherm, and not the specific method steps of claim 7.

For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 8 and 9 is respectfully requested.

Allowance of all pending claims is solicited.

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